NOTE XLII.

REPORT ON THE PODOPHTHALMOUS CRUSTACEA, COLLECTED IN THE YEAR 1891 BY DR. H. TEN KATE IN SOME ISLANDS OF THE MALAY ARCHIPELAGO.

BY

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(Plates 7 and 8).

List of Species.

Leptodius crassimanus A. M. Edw. var.
Thalamita Danae Stimps.
Goniosoma orientale Dana.
Ocypode Kuhlii de Haan.
» *cordimana* Latr.
Varuna literata Fabr.
Leiolophus planissimus Herbst.
Geograpsus sp.
Sesarma Aubryi A. M. E.
» sp.
Remipes denticulatifrons White.
Petrolisthes inermis Heller.
» *Tenkatei* n. sp.
Petrolisthes indicus n. sp.
» *barbatus* Heller.
Clibanarius corallinus (M. E.) Dana.
Coenobita rugosus M. E.
Alpheus Edwardsii Aud.
Caridina typus M. E.
» *timorensis* n. sp.
» *Wyckii* Hickson, var.
Palaemon dispar v. Martens.
» *lar* Fabr.
» *placidulus* de Man.
» *lepidactyloides* de Man.
Gonodactylus chiragra Fabr.
» *scyllarus* L.

1. *Leptodius crassimanus* A. M. E. var.

Confer: de Man, in: Archiv f. Naturgeschichte, Jahrg. 1853, 1888, p. 287.

A single young male specimen from Poeloe Samaoe.

I have described (l. c.) some specimens of *Leptodius* from the Bay of Batavia under the name of *Lept. crassimanus* A. M. E , most of which presented the peculiar shape of the front characteristic of this species, but some of which more resembled *Lept. exaratus* M. E., as regards the shape of the front. The specimen from Poeloe Samaoe now fully agrees with the last-named specimens, the front presenting the same form as in *Lept. exaratus*. The antero-lateral margins, however, are armed with six teeth, the lobes of the upper surface are rather much prominent and finely granulate near the antero-lateral margins and are moreover somewhat rugose on the anterior half of the upper surface. The cephalothorax and the chelipedes are marked on the same manner with the characteristic orange-coloured spots.

For the rest this specimen perhaps may be referred with the same right to *Lept. sanguineus* M. E.

The cephalothorax is 15 millim. broad and $9^1/_2$ millim. long.

2. *Thalamita Danae* Stimps.

Confer: de Man, in: Journal of the Linnean Soc. of London, Vol. XXII, 1888, p. 78, Pl. IV, figs. 8 and 9.

One young male specimen from Poeloe Samaoe.

The fourth antero-lateral tooth is considerably smaller than the other teeth, so this specimen must be referred to the variety *Stimpsonii* A. M. Edw. The abdomen does not present the form that I have figured, l. c. fig. 9, but more resembles the figure published by A. Milne Edwards (Archives du Muséum, T. X, Pl. XXXVI, fig. 1^a), the lateral margins of the penultimate joint not bulging out anteriorly and being rather little convex.

The cephalothorax is $20^1/_2$ millim. broad.

3. *Goniosoma orientale* Dana.

Synon.: *Goniosoma dubium*, Hoffmann, Crustacés de Madagascar, 1874, p. 11, Pl. II, figs. 6, 7, 8.

Confer: de Man, in: Notes from the Leyden Museum, I, 1879, p. 60 and V, 1883, p. 151.

Two male specimens from Endeh, Flores, the cephalothorax of the larger of which is 40 millim. broad.

This species has hitherto only been recorded from the island of Réunion, from the Philippine Islands (Mindanao) and from Timor and doubtless belongs to the rare species of this genus.

4. *Ocypode Kuhlii* de Haan.

Five specimens from Poeloe Samaoe, that are not yet come to full growth, and three of which are still very young, are likely to be referred to the above-mentioned species.

The identification of young individuals of *Ocypode* is difficult, because the cephalothorax has a different form and because the musical ridge is often still wanting or scarcely distinguishable. In the largest individual, however, a female, the cephalothorax of which is 30 millim. broad, the musical ridge is already developped and composed out of nine or ten small tubercles that have the shape characteristic of this species. The male specimen, the cephalothorax of which is 24 millim. broad, also already shows a trace of these tubercles when seen under a magnifying-glass.

5. *Ocypode cordimana* Latr.

Three young individuals from Poeloe Samaoe.

6. *Varuna literata* Fabr.

One young female specimen from the western part of the island of Soemba.

7. *Leiolophus planissimus* Herbst.

Sixty specimens of different size from Endeh, Flores, among which about as many female as male individuals.

The lateral margins of the cephalothorax are armed with four teeth, the extraorbital teeth being included. There are no small tubercles on the posterior cardiacal region, that should be found on that of *Leiol. affinis* M. E. from the Sandwich Islands. Seven or eight small sharp teeth are found on the external half of the supraorbital margins and three or four very small acute tubercles are observed on the internal margins of the antennulary cavities, i. e. upon the lateral margins of the front. These characters are presented by all the sixty specimens, as well by the males as by the females.

The specimen figured by Herbst, is apparently a female.

8. *Geograpsus* sp.

A very young male from Poeloe Samaoe.

This specimen could not be identified by me with any of the known species, on account of its small size, the cephalothorax being only 9 millim. broad; it belongs probably to *Geogr. Grayi* M. E., as the meropodites of the ambulatory legs of *Geogr. crinipes* Dana from the Pacific Ocean are more enlarged.

9. *Sesarma Aubryi* A. M. E.

Two young specimens (♂, ♀) from the island of Great-Bastaard, near Flores.

	♂	♀
Greatest width of the cephalothorax:	11 millim.	$10^1/_5$ millim.
Breadth of the upper frontal margin:	$4^1/_5$ »	$4^3/_4$ »

In these specimens the front therefore not yet measures half the width of the cephalothorax.

The penultimate joint of the male abdomen is $3^2/_5$ millim. broad at its posterior margin and $1^2/_5$ millim. long.

10. *Sesarma* sp.

One young male specimen from the island of Great-Bastaard, near Flores.

It cannot be identified with certainty, but it is closely allied to *Ses. angustifrons* A. M. E. from the Pacific Ocean. This species also presents a great resemblance to *Ses. Weberi* de Man from Flores, but I cannot see a trace of the characteristic transverse ridges that are found on the mobile finger of the anterior legs of the latter form, so that it may not be referred to *Ses. Weberi.*

The cephalothorax is 9 millim. long.

11. *Remipes denticulatifrons* White.

Confer: de Man, Decapoden des Indischen Archipels, in: Max Weber, Zoologische Ergebnisse einer Reise in Niederländisch Ost-Indien, Bd. II, 1892, p. 351.

Four specimens from Endeh, Flores.

The cephalothorax of the two largest is 24 millim. long. In this species the fine interrupted transverse lines on the upper surface of the cephalothorax are very numerous and crowded, for the most part short and all are crenulated in zigzag-lines. The shallow pits bordered with tufts of short hairs, that form a linear series on the lateral margins of the carapace, are numerous and close. The lateral lobes of the front are triangular, spiniform and project beyond the level of the median lobes. The terminal joints finally of the second and third pair of legs are strongly falcate.

12. *Petrolisthes inermis* Heller.

Plate 7, fig. 1.

One single young male specimen, collected together with the following species at Endeh, Flores, ought very likely to be referred to the above-mentioned *Petrolisthes.*

13. *Petrolisthes Tenkatei* n. sp.

Pl. 7, fig. 2.

Eight specimens of different size, viz. seven males and one ova-bearing female were collected at Endeh, Flores, by Dr. ten Kate, whom I have much pleasure to dedicate this new species.

Petrol. Tenkatei belongs to those species the cephalothorax of which is neither armed with a supra-ocular — nor with an epibranchial tooth, and is most closely allied to *Petrol. leptocheles* Heller from the Red Sea, to *Petrol. hastatus* Stimps. and *Petrol. japonicus* de Haan from Japan, and to *Petrol. inermis* Heller that occurs at the Nicobar Islands, at the Mergui Archipelago and on the shores of Java and Flores.

The cephalothorax has nearly the same form as that of *Petrol. inermis* Heller, is still a little broader than long and is distinguished by this character at first sight from *Petrol. elongatus* M. E. and *Petrol. unilobatus* Henderson, the cephalothorax of which is considerably longer than broad. The whole upper surface of the cephalothorax, which is glabrous and shining, is a little punctate on the middle and posteriorly, the little points being somewhat more distant from one another on the mesogastric and on the cardiacal regions than more laterally; as usually transverse elevated lines are observed near the lateral margins and also on the front and as usual a transverse elevated crest is found immediately behind the imaginary line that unites the external angles of the orbits. The little prominent front is triangular, and shows the ordinary mesial furrow, by which the postfrontal crest is interrupted, and on either side of it an oblique lateral one, that separates it from the upper margins of the orbits. The front is rounded at the apex anteriorly, but the lateral margins of it are but very slightly emarginate, sothat lateral lobes can hardly be distinguished. The lateral margins of the front, as also the concave upper margins of the orbits,

are entire, not granulate, and the lateral margins of the cephalothorax are slightly cristate. The under surface is also smooth and shining; only a few punctations are found on the smooth and shining abdomen, the middle joints of which are a little hairy.

The anterior legs are elongate and slender, like those of *Petrol. leptocheles* and *japonicus*. They are somewhat unequal, the right being mostly the larger. The anterior margins of the meropodites are provided with a blunt tooth, that is again finely denticulate; the exterior margins of these joints by which they articulate with the carpopodites, are armed inferiorly with a small acute tooth, both in the male and in the female. In the adult males the carpopodites are still a little longer than the cephalothorax, but in younger specimens they are shorter than it. The carpopodites of the adult male, both of the right and of the left chelipede, are somewhat more than three times as long as broad, but in younger individuals they are comparatively less slender. The carpopodites of the anterior legs of *Petrol. rufescens* Heller, a species that occurs in the Red Sea and according to Hilgendorf also on the shores of Moçambique, are considerably broader and not yet twice as long as broad. The anterior margins of these joints are provided with three or four long, but rather low and little prominent teeth; in young specimens (Fig. 2*b*) the first of these teeth is often sharp, but in older individuals they are rather obtuse prominences and on the carpopodite of the larger or right chelipede of the largest male specimen (Fig. 2), the third tooth is so little developped, that I only observe two teeth, but the left carpopodite presents again four little prominent teeth. The posterior margin is armed, as in *Petrol. inermis* Heller and in *hastatus* Stimps., with a single sharp tooth at the distal end, which is not preceded by smaller ones. The hands are also elongate and slender; the larger is three times as long as measures its greatest

width, whereas the smaller hand is still narrower. The rather little convex upper surface of the hands bears no longitudinal elevated ridge. The outer border of the palm that is entire and not dentate, is nearly straight, but the outer border of the immobile finger is curved inward, somewhat more that of the larger than that of the smaller hand and the entire inner border of the palm is also straight. The fingers of the larger hand of the adult male measure a third of its whole length, but those of the smaller chela are but little shorter than the palm; in younger specimens the fingers are comparatively a little longer. The triangular dactylus of the larger chela is armed at its under surface near the finely granulated inner border, with an oblong smooth tubercle, that is not found on the dactylus of the smaller hand. The fingers of the larger chela are glabrous on their inner borders, but those of the smaller are densely hairy. In one specimen, apparently also a male, the fingers of the larger chela resemble those of the smaller, being longer than in the other specimens, likewise hairy on their inner borders and presenting no oblong tubercle: I consider it to be a variety. For the rest the anterior legs are glabrous. The upper surface of the wrist is marked with fine oblique granulated lines, and appears finely granulated towards the anterior margin; the upper surface of the hands is also finely granulated, the granules being, however, not piliferous, but quite glabrous. The under surface of the hands is also minutely granulated near the inner border.

The ambulatory legs resemble those of *Petrol. inermis* Heller. The meropodites of the first and second pair are armed on their anterior border with a single sharp spinule, the distance of which from the distal end of the border measures a fourth or a fifth of it, but those of the third pair i. e. of the penultimate pair of legs, are quite unarmed. The posterior border of the meropodites of the third pair of ambulatory legs is also entire, not dentate, but that of the meropodites of the

first and second pair is armed near the distal end with a rather large sharp tooth, and often a second smaller tooth is observed between the former and the distal end of the joint. The anterior border of the carpopodites and propodites of the ambulatory legs is entire, nowhere dentate, but the posterior margin of the propodites terminates in a sharp spinule at the distal end. The ambulatory legs are somewhat hairy.

The cephalothorax of the largest specimen, a male, is $8^1/_4$ millim. long and $8^1/_2$ millim. broad, and the larger or right chelipede measures 32 millim. The cephalothorax of the ova-bearing female specimen is $5^3/_4$ millim. long and $6^1/_4$ millim. broad, and its anterior legs have a length of about 17 millim.

Petrol. leptocheles Heller is a closely allied species. I therefore sent a specimen of *Petrol. Tenkatei* to Mr. C. Koelbel of Vienna, who kindly compared it with the type specimens of Heller's species and wrote me back that he considered the species from Flores to be a different one. In *Petrol. leptocheles* indeed the lateral margins of the front are more profoundly emarginate, sothat the lateral lobes are more distinct, the meropodites of all the ambulatory legs have no spinule on their anterior margin, but are quite unarmed, and even the sharp teeth with which the posterior borders of the meropodites of the first and second pair of *Petrol. Tenkatei* are armed, are not found in *Petrol. leptocheles.*

Perhaps our species may once prove to be identical with *Petrol. hastatus* Stimpson, but the lateral margins of the cephalothorax are described as scarcely cristate and the meropodites of the ambulatory legs are probably armed with more spinules as Stimpson says: »merus superne sparsim spinulosus". I therefore conclude, like also by the different habitat, Japan, that Stimpson's species is another one.

An adult specimen of *Petrol. inermis* Heller, described in my paper on the Crustacea of the Mergui Archipelago,

lies before me. This species may be easily distinguished by the less slender chelipedes. The wrist (Fig. 1) is not so slender: that of the larger leg is 11 millim. long and $4^1/_3$ millim. broad. Its anterior margin is always armed with three teeth, that are more acute and more prominent than those of *Petrol. Tenkatei.* The chelae (Fig. 1) are broader in proportion to their length, the larger chela is namely 22 millim. long and 9 millim. broad, whereas the larger chela of *Petrol. Tenkatei* is 18 millim. long and 6 millim. broad. The outer border of the chelae is moreover more arcuate and the fingers of both chelipedes are hairy on their inner borders.

The anterior margin finally of the carpopodites of the anterior legs of *Petrol. japonicus* de Haan bears only one or at most two teeth, a second tooth is observed in this species preceding the distal tooth at the posterior margin of these joints and the anterior border of the meropodites of the ambulatory legs is quite unarmed.

14. *Petrolisthes indicus* n. sp.

Plate 7, fig. 3.

One single male was collected at Endeh, Flores.

This handsome species is most closely allied to *Petrol. mossambicus* Hilgendorf (Monatsberichte Kön. Akad. der Wissenschaften zu Berlin, 1878, p. 825, Pl. II, fig. 6), which inhabits the coast of Moçambique, and it represents the latter in the Malay Archipelago.

The cephalothorax is $5^3/_4$ millim. long and exactly as broad and presents the same form as that of *Petrol. mossambicus.* The front, however, has a different shape. It is much prominent, but it is very narrow and separated by deep lateral emarginations from the internal angles of the orbits that are blunt and obtuse. The lateral margins of the front are somewhat elevated and separated from one another by a deep mesial furrow, that divides itself, as usual, immediately behind

the imaginary line which unites the external orbital angles, in two furrows that border the anterior part of the mesogastric area. The upper margins of the orbits are concave, their external angles straight and the lateral margins of the cephalothorax, which are almost straight and diverge backwards, are distinctly cristate. These lateral margins like also the orbital margins and those of the front, are entire, nowhere dentate, and both a supra-ocular and an epibranchial tooth are wanting. The somewhat convex, glabrous upper surface presents about the same remarkable sculpture as is found in *Petrol. mossambicus*, though not exactly on the same manner. Like as in the Afrika-species, the cervical suture is followed a little more backwards by another one, parallel with the former, and the two epigastrical lobes are tuberculiform, whereas the mesogastric region presents on either side a small tubercle, a few granules being placed before them. No tubercles, however, are observed on the lateral parts of the gastric region. Six symmetrically arranged prominences are found on the cardiacal region, of which the two anterior pairs are separated from one another by a rather broad transverse groove, the two posterior by a very narrow one. Three or four tubercles are observed, on either side, between the two cervical sutures. The posterior cervical suture is bordered by some oblong prominences and many short transverse ridges or elevations are found on the branchial regions, of different size, and which become smaller towards the lateral margins of the cephalothorax and which are so small on the intestinal region, that they may only be recognized there by means of a magnifying-glass.

The median triangular part of the terminal segment of the smooth abdomen is rather long, its posterior margin being not yet twice as broad as measures the length of this part of the telson. The three basal joints of the external antennae are, as in *Petrol. mossambicus*, all equally short.

The left chelipede is wanting. The meropodite of the

other leg bears an obtuse tooth at the anterior margin. The wrist is still a little shorter than the length of the cephalothorax, it is namely 5 millim. long and scarcely 2 millim. broad in the middle and consequently has the same form as in the african species; the rather acute and straight anterior margin presents only one single small obtuse tooth at the proximal end, though it projects a little near the distal end; the posterior margin terminates at the distal end into a rather acute tooth, that is not preceded, however, by a small tubercle. The upper surface of the wrist is marked with a rather deep longitudinal groove, near and parallel with the anterior margin; it is not granulate, but provided with some elevated lines towards the posterior border. The chela resembles the left chela of *Petrol. mosssambicus* (Hilgendorf, l. c. fig. 6); it is 10 millim. long and $4^1/_2$ millim. broad, therefore nearly twice as long as broad. The much flattened palm is slightly obtusely cristate near the straight inner margin and the outer margin is very sharp, a little arcuate and entire. The upper surface is not tubercular, and, like the under surface, almost smooth. The fingers seem to be pubescent on the inner border and a short pubescence seems to have been present also at the under surface of the outer margin of the palm, but the long hairs of *Petrol. mossambicus* are deficient.

The ambulatory legs that are not hairy, have still a little more compressed shape than those of *Petrol. mossambicus*. The anterior margin of the meropodites is sharply carinate, here and there granulate, but not dentate; on the same manner the posterior margin is unarmed, but somewhat granular in the first and second pair. The outer surface of these joints is granulate and rather deeply sulcate almost in the middle, especially that of the meropodites of the second and third pair. The anterior margin of the carpopodites is also carinate and these joints are, like the propodites, somewhat granular; the outer surface finally of the last pair of legs is also granular.

Like as *Petrol. mossambicus*, also *Petrol. indicus* is apparently at first sight distinguished from all the other numerous species of this genus by the sculpture of the cephalothorax and of the ambulatory legs, as also by the form of the carpopodite of the chelipedes; it differs from the species of the shores of Moçambique especially by the different form of the front and by some other characters.

15. *Petrolisthes barbatus* Heller.

Plate 7, fig. 4.

Porcellana barbata, Heller, Crustaceen der Novara-Reise, p. 80, Taf. VI, fig. 8. (1865).

? *Porcellana coccinea* Owen, Crustacea of the voyage of the Blossom, p. 87, Pl. XXVI, figs. 1, 2. — Dana, Unit. States Explor. Exped. Crustacea, p. 423.

Eight fine specimens of different size from Endeh, Flores. As Heller's description of this species is rather incomplete, I sent an adult specimen to Mr. Koelbel, of Vienna, in order to attain accuracy in naming it. Mr. Koelbel kindly compared our specimen with the single type specimen of *Porc. barbata* Heller from the Nicobar Islands in the »K. K. naturhistor. Hofmuseum" and informed me that he was fully convinced that the two species are identical. [1])

Petrol. barbatus Heller belongs to the small number of species which are armed besides with an epibranchial tooth, also with a supra-ocular one. This supra-ocu-

1) On this manner, no doubt, a perfect accuracy is attained in the naming of species, when the original description is insufficient. But then it is a pity when the results of these comparisons are not read or neglected by following authors, because the synonymy then again becomes confused. So for instance Dr. Ortmann (die Decapodenkrebse des Strassburger Museums, IV Theil, p. 262 etc.) has apparently not read my description of *Petrol. dentatus* M. E. (Journal Linnean Soc. of London, Vol. XXII, 1888, p. 216), where I have proved, after having sent one of the specimens to Paris, that *Petr. dentatus* M. E. is really armed with an epibranchial tooth, though Milne Edwards makes no mention of this tooth in the *„Histoire naturelle des Crustacés"*.

lar tooth or spine is placed on the upper margin of the orbits in front of the eye-peduncle, is sharp and directed somewhat obliquely inward and forward (Fig. 4*a*), being separated by a concave emargination from the lateral margin of the front.

Only one single type specimen of *P. barbatus* Heller is still preserved at the Museum of Vienna; it is a female, the left chelipede of which is wanting. A character of importance has neither been described nor figured by Heller. The outer margin of the chelae is namely armed with several, eight to ten, sharp teeth, directed distally, from the articulation of the wrist until the immobile finger. These teeth, as Koelbel informs me, are as distinctly developed and have the same form in the Vienna type specimen as in our species from Flores. The outer margin of the hands is somewhat arcuate. In the Vienna specimen, a fringe of long hairs is found on the outer margin and for a part also on the upper surface of the hand, by which the above-mentioned marginal teeth are entirely concealed. It is perhaps for that reason that Heller says: »die Scheere ist sehr flach mit scharfen Rändern", not describing the teeth. In the specimens from Flores the outer margin of the chelae is also hairy, but these hairs are very short, not longer than the teeth, so that the latter are not concealed by them. Koelbel is disposed to consider the stronger development of hairs on the hand of the Vienna species at most as a secondary sexual difference, because no other real differences are present. Two small sharp teeth are observed, both in the Flores and in the Vienna specimens, also on the inner margin of the palm, near the distal end, at a small distance from one another. The right chela is usually a little larger than the left. The carpopodite is armed at its anterior border with three or four (rarely five) very sharp, distinctly isolated teeth; so in one adult specimen (Fig. 4) the carpopodite of the right larger chelipede bears three, that of the smaller left four teeth, in another specimen the wrists of both

chelipedes are provided with four teeth, though the left chela is a little larger, and in a third example the right leg of which is again the larger one, the right carpopodite presents a very small fifth teeth between the third and the fourth, the left, however, four teeth; in the remaining smaller specimens the carpopodites are armed respectively with four and three teeth.

Heller says: margine posteriore (carpi) non spinuloso. This is not quite exact. The posterior margin terminates at the distal end into a bispinose tooth, that is preceded by one or two smaller ones; the latter, however, are placed on the upper surface of the wrist, sothat they are not visible on the posterior margin itself. Heller therefore did perhaps not observe them or perhaps they are quite absent in the Vienna specimen, as Koelbel makes no mention of them in his letter. The arm bears a sharp tooth at the extremity of the anterior margin, and the exterior border that articulates with the carpopodite, presents two minute sharp teeth on the upper side and a similar spinule at the under surface. As regards the sculpture of the upper surface of the anterior legs, the Flores species fully agrees with the type specimen of Heller. I may observe concerning the following legs that in the Flores specimens the posterior margin of the meropodites of the fourth or penultimate pair presents only one single small tooth near the distal end, in the Vienna type specimen, however, two small teeth, like as the posterior margin of the second and third pair, a slight difference considered by Koelbel as individual. As well in our specimens of Endeh, as in the type example of Heller, the carpopodites of the second legs i. e. of the first pair of ambulatory legs, are armed at the distal end of their anterior border with a sharp spinule, that has not been described by the author of the »Crustaceen der Novara-Reise". The anterior margin of the meropodites of the three pairs of ambulatory legs is armed on its whole length with sharp spinules. As regards the shape of the cephalothorax, and

more especially of the front, and as regards the sculpture of their upper surface, the specimens of Flores fully agree with the type specimen of Vienna.

Our examples show a reddish colour on the upper side, a rather light one, on which the elevated lines and striae are marked with a darker red, and the violet propodites of the ambulatory legs are ornamented with a small white spot near the wrists; the under surface, especially that of the chelipedes, presents a violet hue.

The cephalothorax of the largest specimen is $9^2/_3$ millim. long and $9^3/_4$ millim. broad, thus about as broad as long. *Petrol. barbatus* Heller now is represented in the Red Sea by *Petrol. carinipes* Heller (Fig. 5), a species that bears also an epibranchial- and a supraocular tooth and which presents so great a resemblance to the former that it seems desirable to indicate the few differences between the two species. Before me lies the specimen of *Petrol. carinipes* Heller from Djeddah that I have described many years ago, (Notes from the Leyden Museum, Vol. III, 1881, p. 104), a description to which I refer. In the first place the front of *Petrol. carinipes* (Fig. 5*a*) is comparatively a little broader with more distinct, rounded lateral lobes. Then furthermore the carpopodites of the anterior legs are a little less slender than those of *Petrol. barbatus*. The posterior margin of these joints is armed with four small acute teeth, the distal one of which is double, as in *Petrol. barbatus*, but these teeth extend beyond the middle of the margin and are placed on the margin itself, sothat they are more obvious than in the indian species. In *Petrol. carinipes* the carpopodites of the first pair of ambulatory legs are not armed with the sharp spinule at the anterior margin, which is found in the indian species, not only in the specimen of Djeddah, but also in the type specimen of Heller, as Koelbel writes. The posterior margin of the meropodites of the fourth or penultimate pair of legs of *Petr. carinipes* is entire, not dentate, and finally, according to Koelbel, the median

part of the telson of *Petrol. carinipes* should be comparatively a little longer and somewhat less distinctly emarginate on the lateral margins.

It appears to me very likely that *Porc. coccinea* Owen is identical with *Porc. barbata*, but I cannot decide this question, because Owen makes no mention of the epibranchial tooth, which is moreover not distinctly recognizable on the figure in the »Voyage of the Blossom." Owen's example was collected in the Paumotu Archipelago. According to Dana, whose specimens were collected at the Sandwich Islands, an epibranchial tooth is present, and then the identity becomes of course more probable.

16. *Clibanarius corallinus* (M. E.) Dana.

Confer: de Man, in: Archiv f. Naturgeschichte, Jahrg. 53, 1888, p. 447.

A young specimen from Poeloe Samaoe.

17. *Coenobita rugosus* M. E.

Five young individuals from Poeloe Samaoe.

18. *Alpheus Edwardsii* Aud.

Two female specimens from Endeh, Flores.

19. *Caridina typus* M. E.

Two specimens were collected together with *Car. timorensis* in the freshwater lake of Nefko, on the island of Timor.

20. *Caridina timorensis* n. sp.

Plate 8, fig. 6.

Thirty five specimens were collected in the freshwater lake of Nefko on the island of Timor, amongst which only one single ova-bearing female.

This species is no doubt, most closely allied to *Car. pareparensis* de Man (Max Weber, Zoolog. Ergebnisse u. s. w.

Bd. II, 1892, p. 379, Pl. XXII, fig. 25), but differs by the different form and shape of the rostrum.

Like the above-mentioned species, which inhabits the river near Pare-Pare on Celebes, also *Car. timorensis* belongs to the species of a small size, as it measures only 17 or 18 millim. and brings likewise forth a small number of large eggs, which are 1,2 millim. long and about half as broad.

The rostrum which is short, presents about the same form as in some varieties of *Car. Weberi* de Man (l. c. Taf. XXII, fig. 23*f*), is horizontal or more or less directed downward and mostly reaches a little beyond the first joint of the antennal peduncle, sometimes to the middle of the second joint, sometimes, however, not farther than to the distal end of the first joint. The upper margin bears 3—5 small teeth, placed usually on the anterior half of the rostrum, more or less distant from the apex, at equal or unequal distances from one another, and none of which are placed on the cephalothorax. In a few specimens the upper margin presented only one or two teeth, they wanted completely in four examples, the upper margin being entire — in one specimen, on the contrary, I observed six teeth. The lower margin is armed anteriorly also with 3—5 contiguous, very small teeth. The antennal spine is distinct. The telson which is slightly tapering towards the distal end and which is a little shorter than the rami of the uropoda, bears four pairs of spinules on its upper surface; the distal end is armed with five pairs of spinules, of which those of the first, at the external angles, are very short and the shortest of all, being as long as the spinules of the upper surface, those of the second pair are four times longer and the longest of all, and the three remaining pairs are a little shorter than the second and nearly all of the same length.

The eye-peduncles are as long as the basal spine of the upper antennae, which is a little shorter than the first joint of the peduncle. The second joint is slightly shorter

than the first, the third a little shorter than the second, the whole peduncle does not reach to the distal end of the scales of the lower antennae and the spinule at the extremity of the first joint is short, measuring a third of the second joint. The outer foot-jaws do not reach to the extremity of the scales, but project almost with their whole terminal joint beyond the peduncle of the lower antennae.

The legs of the first pair reach to the extremity of the peduncle of the inferior antennae and are similar to those of *Car. pareparensis*. The rather deeply excavated carpopodite is short and only once and a half as long as broad and the fingers have the same length as the palm. The slightly longer legs of the second pair almost extend to the extremity of the scales and also agree with those of *Car. pareparensis*, as the wrist is a little longer than the chela, of which the fingers are scarcely longer than the palm. The legs of the third pair project a little beyond the scales, those of the fourth extend a little less forward than the second pair and about as far as the legs of the last pair. The dactylopodites of the last pair, that are a little less slender than those of *Car. pareparensis*, being not yet five times as long as broad, are armed at their inner margin with nearly 45 spinules and measure about a third or nearly a third of the length of the propodites.

21. *Caridina Wyckii* Hickson, var.

Plate 8, fig. 7.

Confer: de Man, in: Max Weber, Zoologische Ergebnisse u. s. w., Bd. II, 1892, p. 386, Taf. XXIV, fig. 29.

A single adult, ova-bearing female was collected together with the preceding species, in the freshwater lake of Nefko, Timor.

The rostrum of this specimen, that is 28 millim. long, is lanceolate, slightly directed downwards, reaches only to the middle of the third joint of the antennal peduncle and shows 31 teeth on the upper margin,

and 14 or 15 on the lower. The two or three proximal teeth are placed on the cephalothorax, and all stand close together, the two last ones excepted, that are more distant from one another, the foremost near the apex; the teeth of the lower margin decrease in size towards the apex. By its shortness and by its shape, the rostrum somewhat agrees with that of the specimens from the river near Mbawa on the island of Flores (de Man, l. c. p. 393). The terminal post-abdominal segment is armed on its upper surface with five spinules on the right side and with four on the left and shows nine spinules at the distal end; those that stand at the external angles, are short, as long as the spinules of the upper surface, those of the second pair are four times as long and the longest of all, the spinules of the third and of the fourth pair are almost of the same length and somewhat shorter than those of the second pair, but finally instead of two spinules in the middle, as usual, in this specimen only one single median spinule is observed, which is a little longer than the spinules of the third and fourth pair, and scarcely shorter than those of the second.

The two pairs of antennae fully agree with those of the typical species. The legs of the first and of the second pair are typical. Those of the third reach a little farther, as they extend with a part of their terminal joints beyond the distal extremity of the scales; the legs finally of the fourth pair and those of the almost equally long fifth extend as far as in the typical species. The dactylopodites of the third and of the fourth pair have the same form as usual (de Man, l. c. fig. 29*cc*), being armed with six or seven spinules on their inner border, but they measure a fifth of the length of their propodites, as in the variety: *gracilipes*. The terminal joints of the fifth pair measure a fourth of their propodites, show 50—60 spinules on their inner margin, but have the same form as in the typical species (l. c. fig. 29*dd*).

22. *Palaemon* (*Eupalaemon*) *dispar* v. Martens.

Confer: de Man, in: M. Weber, Zoolog. Ergebnisse u. s. w. Bd. II, 1892, p. 427, Taf. XXVI, fig. 34.

A male from the hill-streamlets of the island of Great-Bastaard, near the north-eastern coast of Flores.

Two ova-bearing females from Maumeri, East-Flores.

The male is 90 millim. long. The rostrum extends as far foreward as the antennal peduncle, the upper margin is somewhat convex and slightly directed downwards at the extremity. The upper margin is armed with ten teeth, of which the first is a little more distant from the second than the following, of which the third is placed justly above the anterior margin of the cephalothorax, whereas the foremost tooth, that stands near the apex, is nearly twice as far distant from the ninth, as the ninth from the eighth. The inferior margin is armed with three teeth. The rostrum therefore shows a great resemblance with that of a male specimen from Timor, that has been formerly figured by me (l. c. fig. 34*b*).

The right leg of the second pair is only present, of which the meropodite measures 11 millim., the carpopodite 17 millim., the palm 15 millim. and the fingers $8^1/_2$ millim. The fingers are armed with some small teeth along the proximal half of their inner edges.

The two females are respectively 75 millim. and 65 millim. long.

The formulae of the teeth of their rostra are $^{1}/_{4}$ and $^{1}/_{2}$; in the former specimen the third tooth stands above the anterior margin of the cephalothorax, in the other immediately behind it and in both specimens the teeth extend along the whole length of the upper margin until near the apex. In each specimen one of the legs of the second pair is deficient; in both, however, the two fingers of the remained leg show several small teeth along their inner edges.

24. *Palaemon* (*Eupalaemon*) *lar* Fabr.

Confer: de Man, in: Notes from the Leyden Museum, T. I, 1879, p. 168 (*ornatus*) and in: Max Weber, Zoologische Ergebnisse u. s. w. Bd. II, 1892, p. 445.

Sixteen specimens from the island of Timor, among which two adult males and five adult ova-bearing females; of these females, however, only one single bears still the two legs of the second pair. The smallest, ova-bearing female is 62 millim. long.

Nine examples from the hill-streamlets of the island of Great-Bastaard, situated near the north-eastern coast of Flores, among which two almost full-grown males and five ova-bearing females.

Eleven young specimens from Roti, near Timor.

Three young individuals from western Soemba.

In all these specimens the distal end of the telson terminates into a sharp, triangular tooth, which in some individuals is more or less rubbed off and in that case of course is less distinct.

25. *Palaemon* (*Macrobrachium*) *placidulus* de Man.

Confer: de Man, in: Max Weber, Zoolog. Ergebnisse etc. Bd. II, 1892, p. 489, Taf. XXVIII, fig. 48.

Five ova-bearing females from Maumeri, East-Flores.

Eleven specimens from the hill-streamlets of the island of Great-Bastaard, near the north-eastern coast of Flores.

One example, destitute of the second pair of legs, from Timor.

As I have formerly indicated, this species seems to be somewhat variable, as regards the length of the fingers of the smaller leg of the second pair in the male, and of the two legs of the second pair in the female. I therefore wish to give a more detailed description of these specimens.

The eleven examples from Great-Bastaard are all ova-

bearing females, with the exception of a single fullgrown male, that bears still the legs of the second pair. This male specimen is 52 millim. long, the rostrum included, and thus a little longer than the largest male in the collection of Max Weber, that had a length of 44 millim. The rostrum reaches to the distal end of the second joint of the antennal peduncle; six of the ten teeth of the upper margin stand on the cephalothorax, and the lower margin shows two teeth. Like as in the mentioned male, that was collected by Prof. Weber on the island of Saleyer, the larger leg of the second pair is found on the right hand and fully agrees with that of the other specimen. The meropodite is 15 millim. long and the carpopodite 17 millim., whereas the latter is 5 millim. broad at the distal end; the chela has a length of 28 millim., the fingers are 12 millim. long. The palm which is 16 millim. long, is $6^1/_4$ millim. broad and $4^1/_2$ millim. thick, consequently compressed in the proportion of 3 : 2. The fingers are a little more slender than those of the male of Saleyer, but are for the rest quite similar. The meropodite of the shorter leg is 10 millim. long, the carpopodite 12 millim., the palm 10 millim. and the fingers 9 millim.: and this leg also agrees with that of the other specimen. The spinulation of these legs is also the same in both individuals.

The ten female specimens of Great-Bastaard are a little smaller than the described male, their length varying between 38 and 42 millim.; they are all nearly of the same size. Only one single female, 38 millim. long, is still provided with both legs of the second pair: the fingers are scarcely or not shorter than the palm; this is also the case with three other examples, which bear still one leg of that pair. One of these specimens shows a singular monstruosity. Only the four first or proximal teeth, that stand on the cephalothorax, are developed, and the rostrum is represented by a strongly arcuate hook, which is sharply acuminate, with the point directed downward,

and that reaches until the distal end of the first joint of the antennal peduncle.

The five specimens, all ova-bearing females, that were collected at Maumeri on the eastern part of Flores, perfectly agree with the female specimen from the river Lella, 48 millim. long, that I have formely described (l. c. p. 492). This resemblance cannot surprise us, as the river Lella streams in the neighbourhood of Maumeri. These examples are considerably larger than the ten of Great-Bastaard, but this fact is sometimes also observed in other species, as is proved by the above-mentioned female specimens of *Palaemon lar* from Timor, that are all provided with eggs, of which the smallest has a length of 62 millim., the full-grown, however, of 10—13 centim., as also by the fact that the ova-bearing females of that species of Great-Bastaard show a middle length of 8 or 9 centim. The five examples from Maumeri are 55—60 millim. long, thus about as long as the adult male from Great-Bastaard. The upper margin of the rostrum is armed with 11—13 teeth, the sixth or seventh of which is placed above the anterior margin of the cephalothorax, the lower margin is armed in all with two teeth. One specimen, that has a length of 58 millim., is still provided with the left leg of the second pair. The meropodite measures $8^1/_2$ millim., the carpopodite has the same length and the chela is 17 millim. long, the fingers measuring 9 millim. The carpopodite of $8^1/_2$ millim. is $3^1/_2$ millim. thick at the distal end, the palm is 8 millim. long, $4^3/_4$ millim. broad and $2^2/_3$ millim. thick. These dimensions show that in this specimen the carpopodite and the meropodite have the same length and that they are only little longer than the palm, which is nearly once and a half broader than the carpopodite and still shorter than the fingers that meet along their inner edges when closed.

In another female, that is 56 millim. long, the two legs of the second pair have nearly the same length and

the same size, and the fingers of both legs are distinctly longer than the palm. In the three other specimens, that have all only one leg, the palm is also shorter than the fingers. It appears to me very probable that in the fullgrown females of this species the fingers are always a little longer than the palm, but that they are shorter than it at a younger age.

The single specimen from Timor must probably be referred to *Pal. placidulus*, but it is a pity that now again, as during the voyage of Prof. Weber, only a single specimen of this species has been collected on that island. The rostrum is armed above with 11 teeth, of which the eighth stands above the anterior margin of the cephalothorax, below with 2 teeth.

26. *Palaemon* (*Macrobrachium*) *lepidactyloides* de Man.

Plate 7, fig. 8.

Confer: de Man, in: Max Weber, Zoologische Ergebnisse etc., Bd. II, 1892, p. 497, Taf. XXIX, fig. 51.

A single fine male from the hill-streamlets of the island of Great-Bastaard.

This specimen is interesting, because it completes our knowledge of this rare species. It is considerably larger than the typical specimen, that was collected by Weber, and that had a length of 46 millim. from the apex of the rostrum to the tip of the telson, the example of Great-Bastaard measuring 74 millim. The rostrum agrees with the first specimen, reaches until the distal end of the second joint of the antennal peduncle and is armed above with eleven, below with two teeth: the six first teeth are placed on the cephalothorax, and the rostrum is narrow and directed downwards. The extremity of the telson is hurted and the right rami of the uropoda are deficient; the still present left rami have exactly the same length, the external being not longer than the internal. The

outer foot-jaws project with their terminal joint beyond the peduncle of the lower antennae, but they do not reach until the extremity of the scales. The legs of the first pair project with two third parts of their carpopodites beyond the distal end of the scales. The right leg of the second pair is the larger. The meropodite of this leg, that is $18^1/_2$ millim. long, projects with its distal half beyond the antennal scales; the carpopodite is 20 millim. long, and 8 millim. thick at the distal end, so that this joint is two and a half times as long as thick, like that of the specimen of Weber. The chela (Fig. 8) or hand is 49 millim. long, and the fingers measure 35 millim. Quite different from the first described individual, the fingers are not as long as the palm, but they are twice as long as it: this difference must, I think, be ascribed to the larger size i. e. to the higher age of this specimen. The palm is 14 millim. broad and 7 millim. thick, consequently as much compressed in the proportion of 2 : 1 as in the other example. The palm is also comparatively as much broader than the carpopodite as in the specimen that was collected by Prof. Weber, namely nearly twice as broad. The outer and the inner margin of the palm are arcuate, and the inner margin of the chela proceeds like a S. The slender and narrow fingers have an interspace between them when closed, that grows narrower towards their tips; neither the index, nor the dactylus shows the large teeth that were found in the specimen of Weber, but each finger shows on the whole length of its inner edge, a double row of numerous, very small sharp teeth. Between the latter, short fine hairs are observed by means of a magnifying-glass.

As regards the characteristic spinulation of this leg, this example agrees with that of Weber, but the spinules of the upper surface of the palm are somewhat more numerous and more crowded, that may be ascribed to the larger size of this individual.

This leg is consequently longer than the whole animal.

The left leg agrees with that of the first specimen. Here also the meropodite which is 12 millim. long, does not yet reach to the extremity of the antennal scales. The wrist, which is 11 millim. long, is likewise shorter than the meropodite and the chela measures 25 millim. The fingers, that are 16 millim. long, are gaping and clothed with the characteristic hairs. The palm is 9 millim. long, 7 millim. broad and $4^1/_3$ millim. thick. In this specimen also the fingers are almost twice as long as the palm. Both legs of the second pair show a sea-green colour and are marked with light spots, whereas the fingers present a light-coloured band, placed on the larger chela near their tips, (Fig. 8), on the smaller in the middle of them.

This species now, of course, appears to be still more allied to *Pal. lepidactylus* Hilgendorf of the coast of Moçambique, because in this specimen the fingers of the larger hand are longer than the palm. Nevertheless I regard the two species to be different. The teeth of the rostrum reach almost until the middle of the cephalothorax, but in the african species they extend only along the distal third of it. The characteristic spinulation of the upper and of the lower surface of the palm of the larger hand is a different one and the character presented by the rami of the uropoda is also shown by this second specimen. The fingers, moreover, of the larger hand of *Pal. lepidactylus* are more hairy and the chela itself has a different form.

27. *Gonodactylus scyllarus* L.

Two specimens from Larantoeka, East Flores.

28. *Gonodactylus chiragra* Fabr.

A single specimen from Poeloe Samaoe.

Middelburg, Sept. 1893.

EXPLANATION OF THE PLATES.

Plates 7 and 8

Fig. 1. *Petrolisthes inermis* Heller. Larger chelipede of a full-grown specimen from the Mergui Archipelago. × 2..

Fig. 2. *Petrolisthes Tenkatei* de Man, from Endeh, Flores, male, × 2; 2*a*, front of the same specimen, × 5; 2*b* the carpopodite of the left, smaller chelipede of another younger specimen, in which the teeth of the anterior margin are more distinct, × 4.

Fig. 3. *Petrolisthes indicus* de Man, from Endeh, Flores, × 3; 3*a* front of the same specimen, × 6.

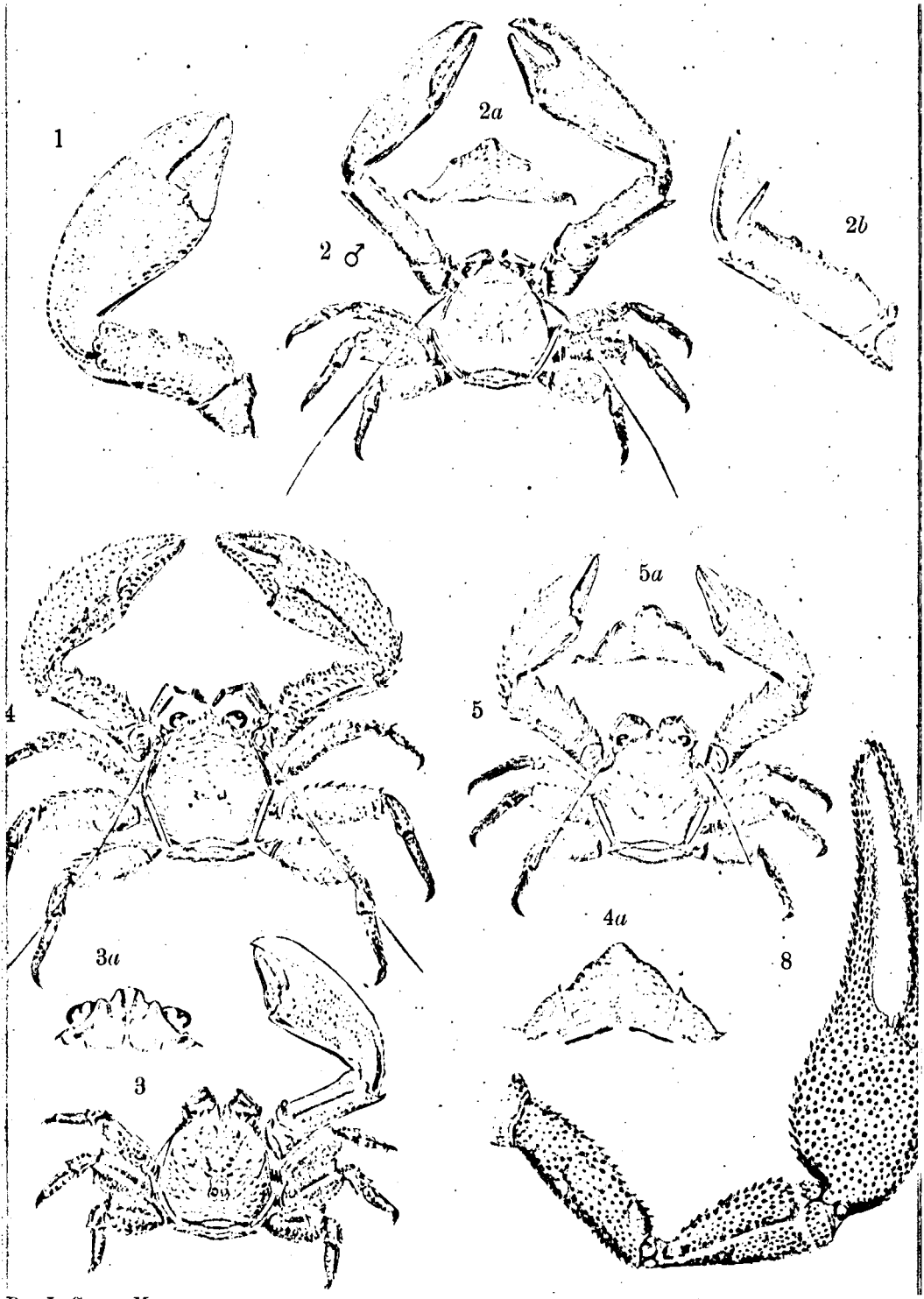
Fig. 4. *Petrolisthes barbatus* Heller, male specimen from Endeh, Flores, × 2; 4*a* front of the same individual, × 6.

Fig. 5. *Petrolisthes carinipes* Heller, specimen from Djeddah, Red Sea, × 3; 5*a* front of this specimen, × 6.

Fig. 6. *Caridina timorensis* de Man, Figs. 6*a*, 6*b* and 6*c* lateral view of the rostrum, of the eyes and of the basal part of the antennal peduncle of three individuals; 6*d* carpopodite and chela of the first pair of legs, 6*e* the same joints of the second pair, 6*f* dactylopodite of a leg of the fifth pair, 6*g* an egg. All the figures are twenty five times magnified, with the exception of fig. 6*f* which is fifty times.

Fig. 7. *Caridina Wyckii* Hickson, var. Lateral view of the rostrum of a female specimen from Timor, × 6; 7*b* distal end of the rostrum of this specimen, × 25.

Fig. 8. *Palaemon (Macrobrachium) lepidactyloides* de Man, larger chelipede of a male specimen, collected in the hill-streamlets of the island of Great-Bastaard.



Dr. J. G. DE MAN DEL.

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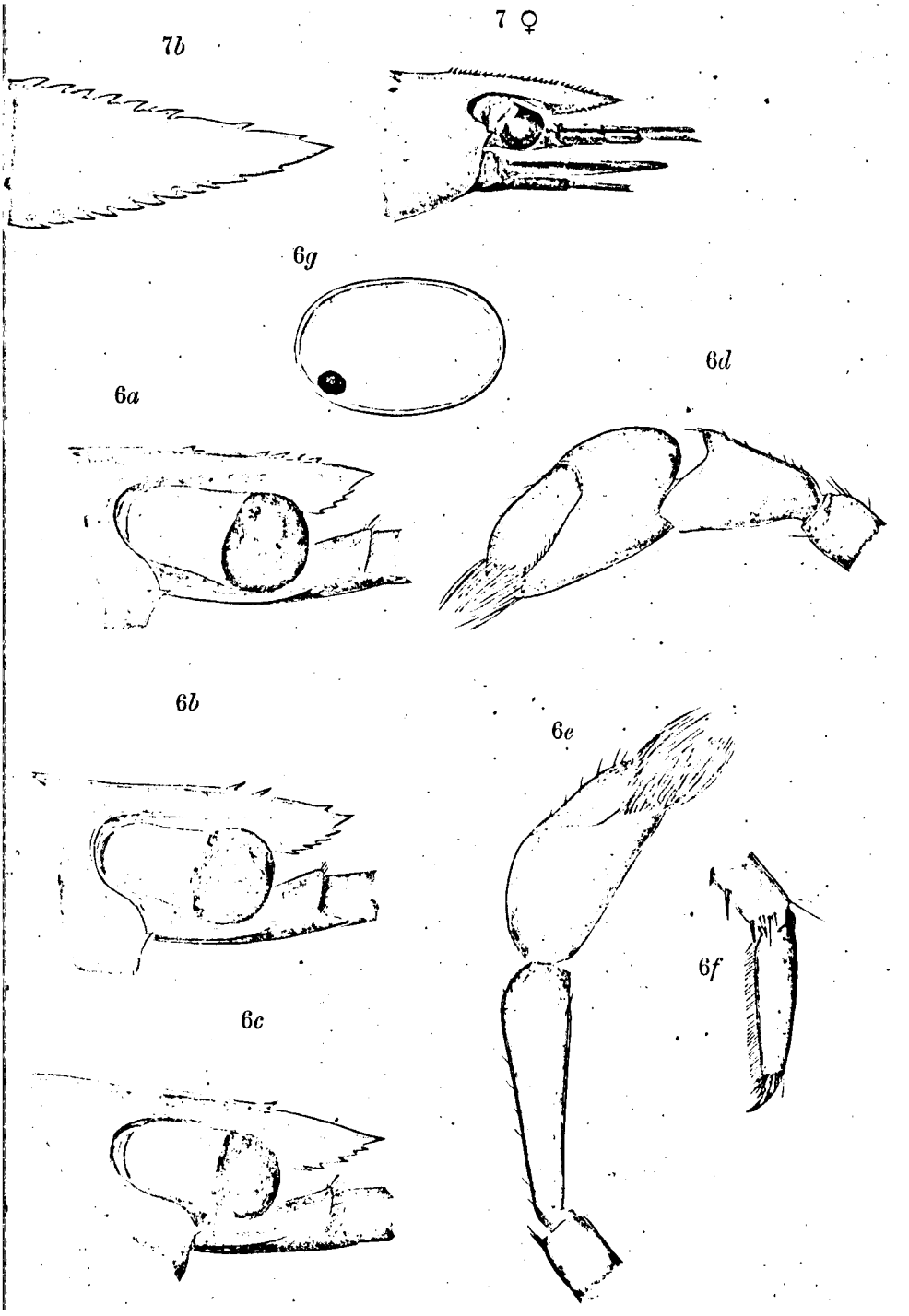
1. Petrolisthes inermis *Heller*.
2. Petrolisthes Tenkatei *de Man*.
3. Petrolisthes indicus *de Man*.
4. Petrolisthes barbatus *Heller*.
5. Petrolisthes carinipes *Heller*.
8. Palaemon lepidactyloides *de Man*.



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Lichtdruk van Emrik & Binger, Haarlem.

6. Caridina timorensis *de Man*.
7. Caridina Wyckii *Hickson*, var.